

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application Of: )  
GRAHAM M. STUART )  
Application No.: 10/685,303 )  
Filed: 10/14/2003 )  
Group Art Unit: )  
Examiner: )  
CROSS-OVER PREVENTION VALVE )

TRANSMISSION OF PRIORITY DOCUMENT

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Sir:

Enclosed is a certified copy of the priority document identified in the formal papers of this application as filed.

The claim for priority made in the formal papers is reiterated.

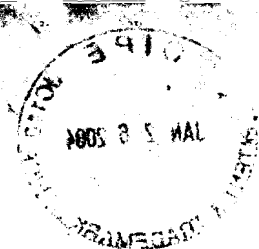
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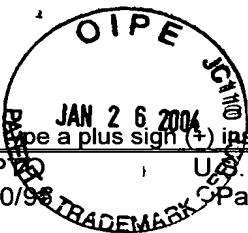
Respectfully submitted,

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Application Number	10/685,303
Filing Date	10/14/2003
First Named Inventor	Graham M. Stuart
Group Art Unit	
Examiner Name	
Attorney Docket Number	1088-00017

### TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Total Number of pages in this Submission 3+

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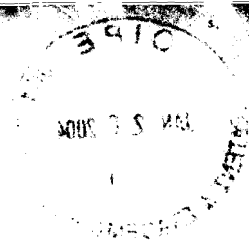
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Date	January 23, 2004

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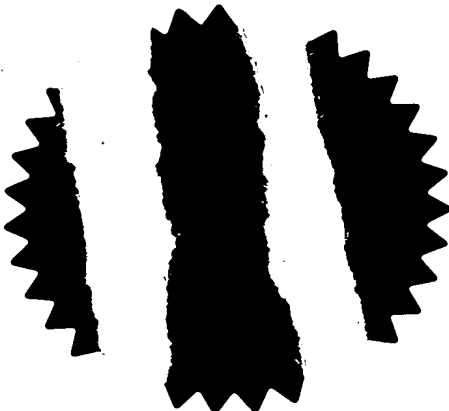
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Dated 16 October 2003





1/77

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NS/JT/02440GB

2. Patent application number

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0224110.7

17OCT02 E756381-5 000016  
P01/7700 0.00-0224110.7

3. Full name, address and postcode of the or of each applicant (underline all surnames)

RISBRIDGER LIMITED  
Stychens Lane,  
Bletchingley,  
Nr. Redhill, Surrey RH1 4LN

16 OCT 2002

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

7533821001

*[Signature]*

4. Title of the invention

"Cross-Over Prevention Valve"

5. Name of your agent (if you have one)

BROOKES, BATCHELLOR  
102-108 Clerkenwell Road,  
London EC1M 5SA

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

Patents ADP number (if you know it)

08142291001

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Country

Priority application number  
(if you know it)

Date of filing  
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7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing  
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- a) any applicant named in part 3 is not an inventor, or
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# Patents Form 1/77

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Claim(s)	1
Abstract	1
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Translations of priority documents

Statement of inventorship and right to grant of a patent (Patents Form 7/77) 1

Request for preliminary examination and search (Patents Form 9/77) 1

Request for substantive examination (Patents Form 10/77) 1

Any other documents  
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11. I/We request the grant of a patent on the basis of this application.

Signature

Date



BROOKES BATCHELLOR

16th October 2002

12. Name and daytime telephone number of person to contact in the United Kingdom

Mr. N. Shindler - 020 7253 1563

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"Cross-Over Prevention Valve"

This invention relates to a valve intended for installation at the inlet of a fluid tank, and in particular, to a valve which is intended to prevent the contents of the tank from becoming contaminated, as a result of being filled with the wrong fluid.

In large multiple fuel tank installations, for example on petrol station forecourts, there may be a number of storage tanks intended for different grades or types of fuel. Unintentional contamination of one fuel by another, can easily take place if care is not taken when the fuels are delivered and, can cause considerable damage, for example if diesel fuel finds its way into a petrol tank, or vice versa. Since all of these fuels are commonly delivered by tankers with multiple fuel compartments, and all of the storage tanks have similar filler inlets, such an error can easily occur if the tanker operative is in a hurry.

International patent application no. WO 00/55598 (Masstech International Limited) describes a device for detecting the presence of a chemical contaminant, the device comprising an indicator element which is held in a first position by means of a failure element which is held in tension, the failure element being made of a material which fails in the presence of the chemical to be detected, thereby releasing the indicator element from its first position and allowing it to move into a second position in order to provide an indication of the presence of the contaminant.

The failure of the failure element may occur by shearing or stretching of the element, or, more typically, may occur when the surface of the element is degraded by the contaminant, in such a way as to release it from engagement with another part of the mechanism.

The present invention utilises a similar arrangement, in order to trigger the movement of a valve member, in the presence of a contaminant. Accordingly, the present invention provides a valve mechanism which is resiliently biased towards a first

position but is normally retained in a second position by means of a linkage including a chemically sensitive device which is arranged to release in the presence of a contaminant.

Preferable the valve is biased towards a closed position but is normally held open  
5 by the retaining linkage.

Preferably, the chemically sensitive device comprises an elongate tie member, at least one end of which is frictionally engaged by a cooperating member which connects it to the remainder of the valve mechanism, and whose surface is chemically degraded by the contaminant so that the frictional engagement is lost. For example, the failure  
10 element may be made from a material which is dissolved by the contaminant, or may have a surface whose co-efficient of friction changes in the presence of the contaminant. This may result from a change in viscosity of the surface.

In a preferred embodiment, the valve mechanism includes a movable closure element mounted in a conduit, which is resiliently biased towards a position in which it  
15 closes the conduit, but is held in the open position, against the resilient bias, by means of a chemically sensitive device of the type described above.

One embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings in which:

Figure 1 is a perspective view of a device according to the invention, showing  
20 some hidden detail;

Figure 2 is an enlarged side elevation of part of the device of Figure 1; and

Figure 3 is a plan view of the device of Figure 1, again showing some hidden detail.

Referring to Figure 1, the device as illustrated includes a circular butterfly valve  
25 member 2 pivotally mounted on trunnions 4 and 6 in a conduit 8. As shown, the valve is in the open position in which the butterfly is parallel to the axis of the conduit, and is

shielded from flow turbulence forces at the inlet 10, by a transversely extending fixed vane plate member 12 which also provides an intake port for housing 60.

5 The trunnion member 6 is connected to an actuating mechanism 14 mounted on the outside of the conduit 8, in a housing 16. As shown in more detail in the enlarged view of Figure 2, the mechanism comprises a plate member 18 forming a crank arm, and having axially extending pins 20 and 22 mounted at opposite ends of a diameter of the plate which, in the open position shown, is at 45° to the axis of the conduit.

10 The upper pin 20 is connected by means of a chemically sensitive device comprising a "chemical fuse" 24, described in more detail below, to a fixed pin 26 of the mechanism, whilst the lower pin member 22 is connected by a tension spring 28 to a further fixed pin member 30.

15 In the example illustrated, the "chemical fuse" member 24 comprises a tubular member of material which is chemically sensitised to a contaminant, in such a way that its surface characteristics change rapidly in the presence of the contaminant. The tubular member is provided with end caps 30 and 32 having axial bores which are a close interference fit on the ends of the tube, and transverse bores to receive the locating pins 20 and 26.

20 In operation, if a contaminant fluid enters the conduit, a sample portion of fluid will enter the housing 16 via intake aperture 35, and will exit housing 16 via apertures 34, into the low pressure zone downstream of vane member 12. This through flow fluid will contact and react with the surface of the "chemical fuse" member, so that the outer surface will rapidly degrade. Under these conditions end caps 31, 32 become a slightly looser fit, until the tension spring 28 overcomes the retaining force of the fuse member. At this point the spring will deflect the butterfly member 2 into the main flow stream.

25 Flow forces will then assist the spring to rapidly close the butterfly valve over the full 90° movement.

As illustrated, the housing 16 of the valve member is provided with drain plug 36 so that in the event of a shut-off condition contamination fluid upstream of the closed butterfly member 2 can be drained away externally. This plug can also be used to take fluid samples.

5        In addition, the entire housing can be dismantled, to replace the "chemical fuse" when it has been triggered.

It will be appreciated that as illustrated, the device is arranged to close a filler inlet in the event of detection of a predetermined substance. However, it could equally be employed in a context where it was required to open in the presence of a predetermined  
10        substance, for example to allow it to escape through an overflow.

CLAIMS

1. A valve mechanism which is resiliently biased towards a first position but is normally retained in a second position by means of a linkage including a  
5 chemically sensitive device which is arranged to release in the presence of a contaminant.
2. A valve mechanism according to claim 1 in which the first position is a closed position and the second position is an open position.
3. A valve mechanism according to claim 1 or claim 2 in which the  
10 chemically sensitive device comprises an elongate member having at least one end whose surface is frictionally engaged by a co-operating member of the mechanism, and is adapted to be chemically degraded by the contaminant so that the frictional engagement is lost.
4. A valve mechanism according to claim 2 comprising a butterfly which is  
15 rotatably mounted in a conduit so as to close the conduit when the chemically sensitive device is activated.
5. A valve mechanism according to claim 4 in which the linkage comprises a crank connected to the rotatable mountings of the butterfly, and a tension spring connecting the crank arm to a fixed point so as to bias it to the closed position, the  
20 chemically sensitive device being arranged to retain the crank in the open position.
6. A valve mechanism according to claim 5 in which the chemically sensitive device comprises an elongate member having end caps which are an interference fit on each end, one of which connects it to the crank, so that the end cap is released when the surface of the chemically sensitive member is degraded by the contaminant.
- 25 7. A valve mechanism substantially as herein described with reference to the accompanying drawings.

## ABSTRACT

### "Cross-Over Prevention Valve"

5

A valve mechanism which is resiliently biased towards a first position but is normally retained in a second position by means of a linkage including a chemically sensitive device which is arranged to release in the presence of a contaminant.

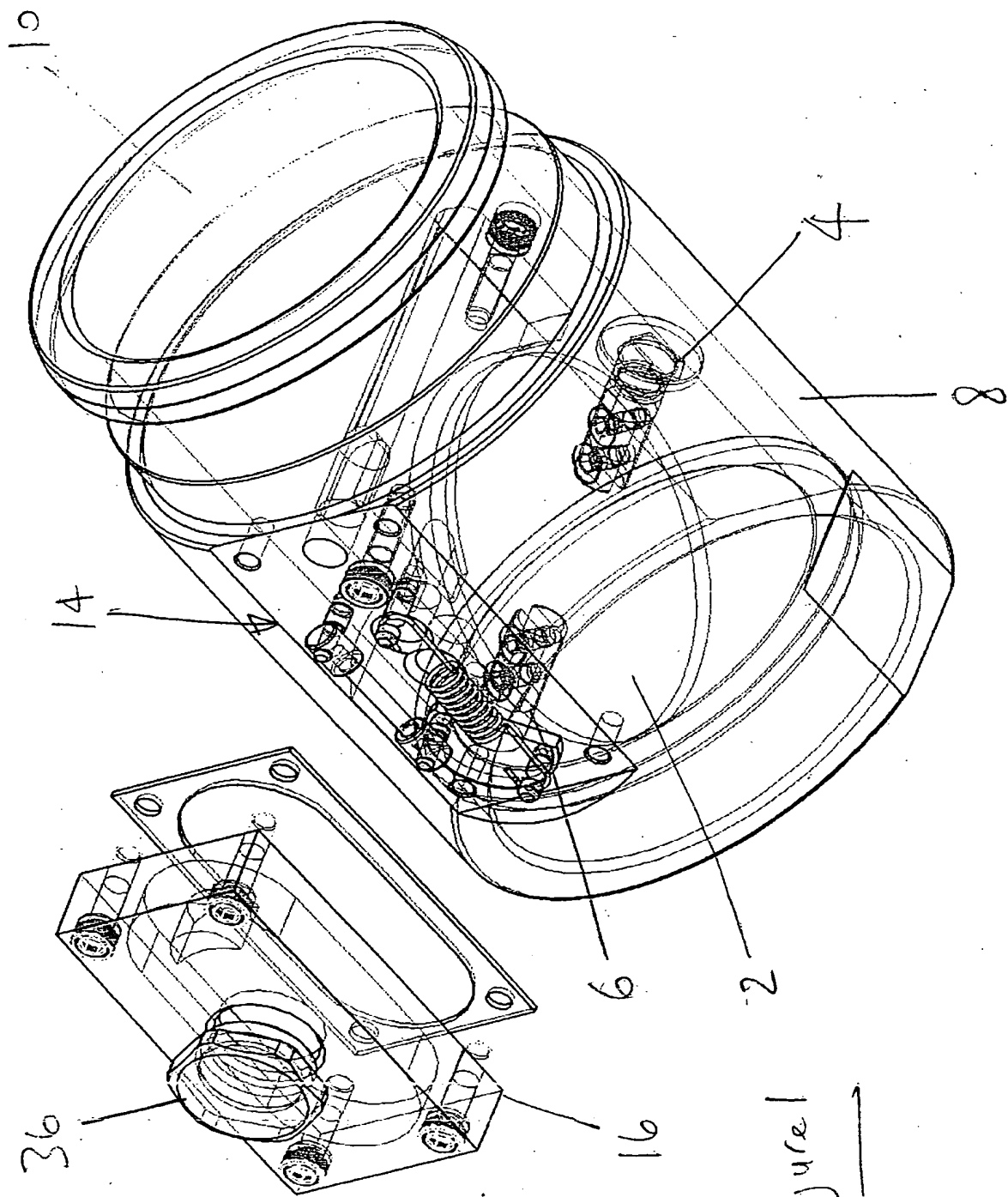


Figure 1

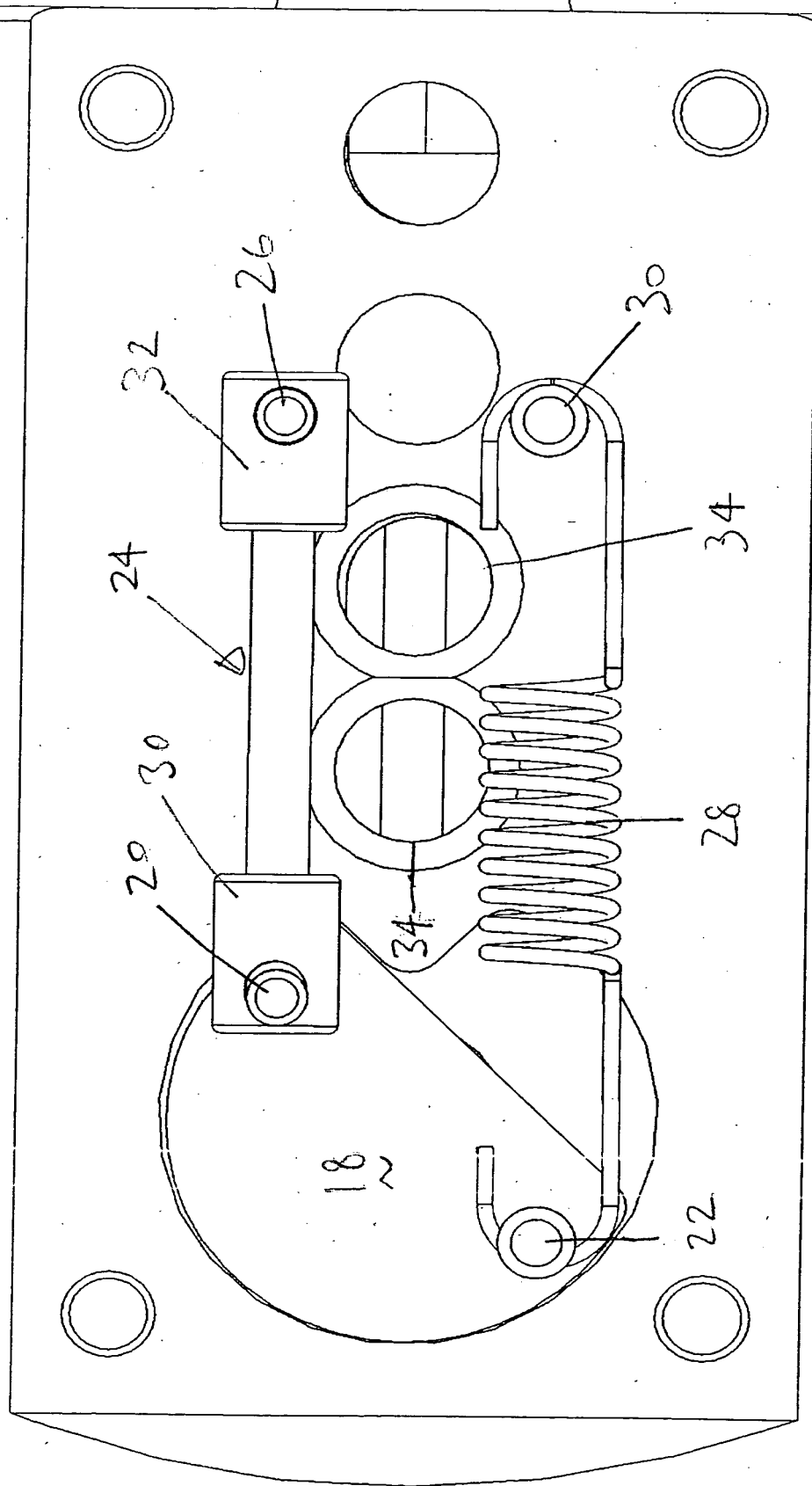


Figure 2



